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United States
Department of
Agriculture

**Animal and
Plant Health
Inspection
Service**

**Veterinary
Services**

APHIS 91-39

National Tick Surveillance Program

Calendar Year 1985

EXCHANGE Rec'd

AUG 10 1987

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NATIONAL AGRICULTURAL LIBRARY
CURRENT SERIAL RECORDS
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National Tick Surveillance Program
Calendar Year 1985

During calendar year 1985, the collection and submission of ticks from native and imported animals plus plant and animal material was 30 percent less than in 1984. There were 5,037 collections in 1985, 7,213 in 1984, 10,207 in 1983, and 9,086 in 1982.

Boophilus microplus and Babesiosis in Puerto Rico

The Cooperative Commonwealth-Federal Tick Eradication Program in Puerto Rico is continuing toward its goal of eradication of *Boophilus* ticks from Puerto Rico. In April 1985, babesiosis was found in herds in the northwestern part of Puerto Rico, which made it necessary to modify the emphasis of the program to prevent spread of babesiosis throughout the island.

The two headquarters for the Puerto Rican tick eradication programs are in the east at Juncos and in the west at Arecibo. The original babesiosis outbreak was in Hatillo near the Arecibo station. This is predominantly a dairy area where a large percentage of the cattle are located. A decision to concentrate more manpower, vehicles, and equipment in this area was made to eradicate the *Babesia* carrier ticks and prevent the spread of babesiosis. The total tick eradication budget for 1985 was $11,585,909, with funds from USDA, APHIS, VS; the Commonwealth of Puerto Rico; and the USDA Food and Nutrition Service as the cooperating sources. Veterinary Services put another $800,000 at the disposal of the babesiosis program to buy equipment and materials. In 1985 approximately 6,000 herds with 95,000 animals were under treatment each month in the two eradication areas.

Amblyomma variegatum in Puerto Rico

The Tropical Bont Tick eradication program in Puerto Rico is nearing completion. All herds in the area of initial infestation in the central part of the Island have been released. In July 1985 these herds were revisited, thoroughly inspected, and found free of *A. variegatum.* Several collections of *Amblyomma variegatum* ticks were found in other areas of Puerto Rico and the US Virgin Islands in 1985 during surveillance scratching. These were single male ticks with the exception of one case in which one female and three males were found and identified. The specific findings were as follows: Cabo Rojo - May 1985 (3 males, 1 female) and June 1985 (1 male); Culebra - September 1985 (1 male); Quebradillas - November 1985 (1 male); St. Croix, V.I. - October 1985 (1 male); and Vieques - February 1986 (1 male). These ticks were in herds without prior incidence of infestation and without other *A. variegatum* ticks in the herd or the adjacent areas. Treatment and/or surveillance is being maintained on these herds.

Boophilus Tick Eradication in Texas

State and Federal tick eradication personnel continued tick surveillance activities in Texas during 1985. A total of 1,969 tick collections were made in 1985, as compared to 3,256 collections in 1984.

In 1985, Veterinary Services tick eradication inspectors apprehended 105 head of livestock, which entered Texas from Mexico along the border from Brownsville to Del Rio. This compares to 163 head apprehended in 1984. Fifty-one of the 1985 apprehensions were cattle of which 29 were infested with *Boophilus* ticks. Fifty-four apprehensions were horses; none were infested with ticks.

In December of 1985 *Boophilus* ticks were found on cattle in the free area of Cameron County, which later resulted in the finding of eight tick-infested premises in this county. Traceouts from the infested premises in Cameron County led to the issuance of quarantines in 22 additional counties in Texas. With the assistance of the State tick force, the traceouts were quickly completed and treatment begun on exposed livestock. Inspections revealed ticks on livestock in only two counties other than Cameron County.

The permanently quarantined buffer zone, under both State and Federal quarantines, extends approximately 500 miles from Del Rio to the Gulf of Mexico. The zone is regularly patrolled by Veterinary Services inspectors who apprehend stray and smuggled animals from Mexico and prevent the dissemination of *Boophilus* ticks into Texas. The tick patrol along the Rio Grande is the first line of defense against the reintroduction of *Boophilus annulatus* and *B. microplus* into the southern United States.

There are three important reasons for preventing the reintroduction of *Boophilus* ticks into the southern United States. First, these ticks are serious pests and parasites of livestock, especially cattle; and in areas where they are enzootic they exact tremendous economic losses on livestock by their continued annoyance and bloodsucking, even when there is no transmission of disease agents. In areas of the world where *Boophilus* ticks are a problem, livestock owners have found it necessary to institute regular tick control programs, often monthly, in order to prevent serious losses. These routine treatments, used as control rather than eradication tools, often lead to the development of acaricide resistance in *Boophilus* populations. Resistance is a serious problem in Australia, South Africa, Argentina, and more recently in limited areas of Mexico.

Following the development of acaricide resistant tick populations, control becomes much more complicated and many times more costly.

Second, with the introduction of *Boophilus* ticks and the heavy infestation of large areas, cattle tick fever (babesiosis) ultimately becomes a serious problem. There are several species of *Babesia* organisms which affect cattle, but

essentially the conditions are similar, differing only in severity and response to treatment. *Babesia* destroy the red blood cells causing hemoglobinuria and anemia. This is accompanied by a rise in body temperature, depression, and loss of appetite and body weight. The animal often goes into a coma and dies. In severe outbreaks, mortality may approach 90 percent. Adult cattle are especially susceptible to babesiosis. Unfortunately, several drugs which are effective against babesiosis are not currently marketed in the United States, since they do not have clearance from the Food and Drug Administration. In the absence of chemotherapeutic agents for use in an outbreak of babesiosis, the best alternative is to immediately initiate a dipping program at 7-or 14-day intervals to break the life cycle of the tick vector and stop disease transmission by the ticks.

The third, but often overlooked, reason for preventing the reintroduction of *Boophilus* ticks is the fact that they are extremely efficient vectors of bovine anaplasmosis. In the Southern States, bovine anaplasmosis is an economically important disease which causes a loss of approximately $50 million a year to the livestock industry. In the South, bovine anaplasmosis is primarily transmitted by biting insects, especially horse flies; whereas in the Northwestern States it is chiefly tick borne and transmitted to species of ticks not established in the Southern States. Insects are mechanical vectors of *Anaplasma marginale,* with a limited potential for disease transmission. Some ticks, *Boophilus* included, are biological as well as mechanical vectors of *A. marginale* and may transovarially transmit anaplasmosis. The reintroduction of *Boophilus* in the South would greatly diminish the hopes of controlling bovine anaplasmosis. Control of the disease would become more difficult and costly with the presence of *Boophilus* ticks.

Exotic Tick Interceptions

During 1985 there were several significant interceptions of exotic ticks by Veterinary Services (VS) and Plant Pest Quarantine (PPQ) personnel along the eastern seaboard of the United States. In September 1985, VS personnel in New York detected a heavy infestation of *Dermacentor reticulatus* on five carriage horses returning from France. The five horses, originally from the United States, were returning to the United States after a visit to France. While in France the horses became infested with *D. reticulatus,* a tick common in areas of western Europe and Russia. *Dermacentor reticulatus* is similar in gross appearance to *D. variabilis,* a widespread American species of tick. However, reportedly *D. reticulatus* is a vector of *Babesia bovis, B. caballi, B. equi,* and *B. canis.* Like *D. variabilis* it has a wide host range, which includes cattle, horses, dogs, a variety of small rodents, and occasionally, birds. Quite possibly *D. reticulatus* could survive in the United States where populations of *D. variabilis* are present and thereby pose an additional threat to livestock and wildlife in these areas. Once introduced, the exotic tick would be easily overlooked because of its gross similarity to *D. variabilis.* The horses were treated and freed of ticks while in quarantine at the New York Animal Import Center.

On three separate occasions in 1985, PPQ personnel in New York found live *Ixodes pilosus* ticks on cut flowers being imported from South Africa. The hosts for *I. pilosus* in South Africa include cattle, horses, goats, sheep, hogs, and dogs, as well as the bushbuck which is probably the main wild host. The disease relations of *I. pilosus* are unstudied.

In another PPQ interception on cut flowers from South Africa, the tick *Rhipicephalus capensis* was found in the live state on cut flowers. This tick has a broad host range, which includes cattle, buffalos, antelopes, goats, pigs, and dogs. It is found in three diverse bioclimatic zones of Africa and is a vector of *Theileria parva* which produce East Coast Fever in cattle.

In February 1985, PPQ inspectors at the port of Baltimore found *a* live *Ixodes hexagonus* on a load of cork imported from Portugal. This tick parasitizes weasels, ermine, polecats, foxes, hedgehogs, and less commonly, dogs. Unfortunately, the disease relations are unstudied.

The above interceptions illustrate that one must be alert for the introduction of exotic ticks on plants and inanimate objects, as well as on animals. Both VS and PPQ personnel are encouraged to collect and submit suspected exotic specimens of ticks and other parasites and pests. Animal and Plant Health Inspection Service personnel requiring information on the collection and submission of ticks should carefully review VS Memorandum 558.1, September 8, 1978, for detailed instructions. This memorandum can be obtained from any VS area veterinarian in charge.

Update of Lyme Disease

Lyme disease, the most recently recognized tick-borne disease continues to receive attention as more is found out about its etiology, transmission, and distribution. First recognized in children in Lyme, Connecticut, in 1975, the disease is now known to be present in Wisconsin, Minnesota, California, and Oregon, as well as Europe and Australia. Undoubtedly it will be recognized as even more widespread as research continues on the problem.

The etiology of Lyme disease was determined in 1982 as *Borrelia burgdorferi,* a tick-transmitted spirochete. The principal known vectors are *Ixodes dammini* in the Northeast and limited areas of the Midwest, and *I. pacificus* on the West Coast. In Europe, *I. ricinus* is probably an important vector. At present, *I. scapularis,* a tick common in the Southeast, is not known to transmit the *B. burgdorferi.* There is reason to suspect that two other common ticks, *Amblyomma americanum* and *Dermacentor variabilis* may play at least a secondary role in the transmission of the disease.

Amblyomma americanum has been removed from patients with the characteristic skin lesions of Lyme disease. Also, the spirochete of Lyme disease has been isolated from both *A. americanum* and *D. variabilis.* If these two ticks are found to be efficient transmitters of the agent of Lyme disease, then the potential geographical distribution of the disease will be greatly extended.

Animal and Plant Health Inspection Service personnel working in situations where they are exposed to ticks should be alert to the signs and symptoms of this recently recognized disease. In humans, Lyme disease is characterized by a skin lesion (erythema chronicum migrans) that may be accompanied by headache, stiff neck, fever, malaise, fatigue, aching muscles and joints, and swollen lymph nodes. Weeks or months later some patients develop brain and heart infections, central and peripheral nervous disorders, and migratory musculoskeletal pain. Still later arthritis may develop and persist for several years resulting in erosion of cartilage and bone. Persons experiencing fever and symptoms following exposure to tick bites should immediately consult a physician. Lyme disease, like Rocky Mountain spotted fever, should be diagnosed and treated by a physician.

Heartwater Menace Increasing

Heartwater is a rickettsial disease of ruminants spread by several species of ticks of the genus *Amblyomma.* Traditionally a plague of domestic and wild ruminants in Africa, heartwater organisms and African bont ticks *(Amblyomma variegatum)* have been introduced to the Caribbean islands of Antigua, Guadeloupe, and Marie Galante. To make matters worse, the African tick has been spread to over a dozen additional Caribbean islands. These events pose an extremely serious threat to domestic and wild ruminants of the United States. Heartwater can produce mortality rates exceeding 50 percent in domestic cattle and sheep, and there is no effective vaccine or treatment. Experimental infections at the USDA's Plum Island Animal Disease Center have demonstrated heartwater to be highly lethal for white-tailed deer. If heartwater-infected animals or ticks are introduced into the southern United States, it will result in a foreign animal disease emergency with almost certain involvement of white-tailed deer. Deer losses due to this awesome pathogen could devastate this big game resource. Furthermore, deer that survive infection may have to be slaughtered as disease carriers. In addition to the African bont tick, the gulf coast tick *(Amblyomma maculatum)* that is often found on deer in the Southeast has been shown to be capable of transmitting heartwater. Real trouble could be on the horizon unless action is taken soon. A plan is being formulated for bont tick eradication on the affected islands in the West Indies. As proposed during a recent meeting of the Secretary of Agriculture's Advisory Committee on Foreign Animal and Poultry Diseases, the program would be administrated by the Agency for International Development, and provide economic benefits to the island dwellers as well as protection for the United States. With big game resources very much at risk, wildlife conservationists would be wise to actively support this disease eradication effort while the problem is still contained on small islands without deer. (Southeastern Cooperative Wildlife Diseases Study, College of Veterinary Medicine, University of Georgia, Athens, Georgia, 30602.)

1985 Research Highlights—Cattle Fever Tick Research Laboratory, USDA, Agricultural Research Service

In 1982 a population of *Boophilus microplus* in the State of Vera Cruz, Mexico, was reported to be resistant to coumaphos and other organophosphate acaricides. By December of 1984 the distribution of resistant *B. microplus* was known to include the northern one-half of Vera Cruz and the contiguous areas of the adjacent states of Tamalipas, San Luis Potosi, Hidalgo, and Puebla. Concern within the United States about the introduction of acaricide resistant ticks into Texas, prompted efforts to obtain samples of resistant ticks. Research entomologists at the USDA, ARS, Cattle Fever Tick Research Laboratory, Mission, Texas, conducted studies to characterize the spectrum of resistance to acaricides available to the Tick Eradication Program and to test new compounds as alternatives. Two strains of acaricide resistant ticks from Mexico are discussed below.

During July of 1984, through the joint efforts of Veterinary Services and Agricultural Research Service, collections of *B. microplus,* the tropical cattle tick, were made from several locations in southern Mexico. Preliminary bioassays to evaluate susceptibility to organophosphate (OP) acaricides suggested that ticks in samples from several locations behaved abnormally. The so-called "Tuxtla"strain was designated for selection experiments to determine if the frequency of the genetic factor for resistance could be increased. At the Cattle Fever Tick Research Laboratory, Mission, Texas, the Tuxtla strain has been subjected to pressure through ten generations to select for a homogeneous OP resistant strain. The Tuxtla strain in colony at the Mission Laboratory is at present, approximately 20 times more resistant to coumaphos than normally susceptible strains of *B. microplus.* Once laboratory studies indicate the colony has achieved a sufficiently high level of homogeneity of resistance factor and that point is near, efforts will be made to characterize the degree of resistance of the ticks to a variety of acaricides. This will enable laboratory personnel to determine the degree of protection that can be obtained with presently available chemicals or possible substitutes.

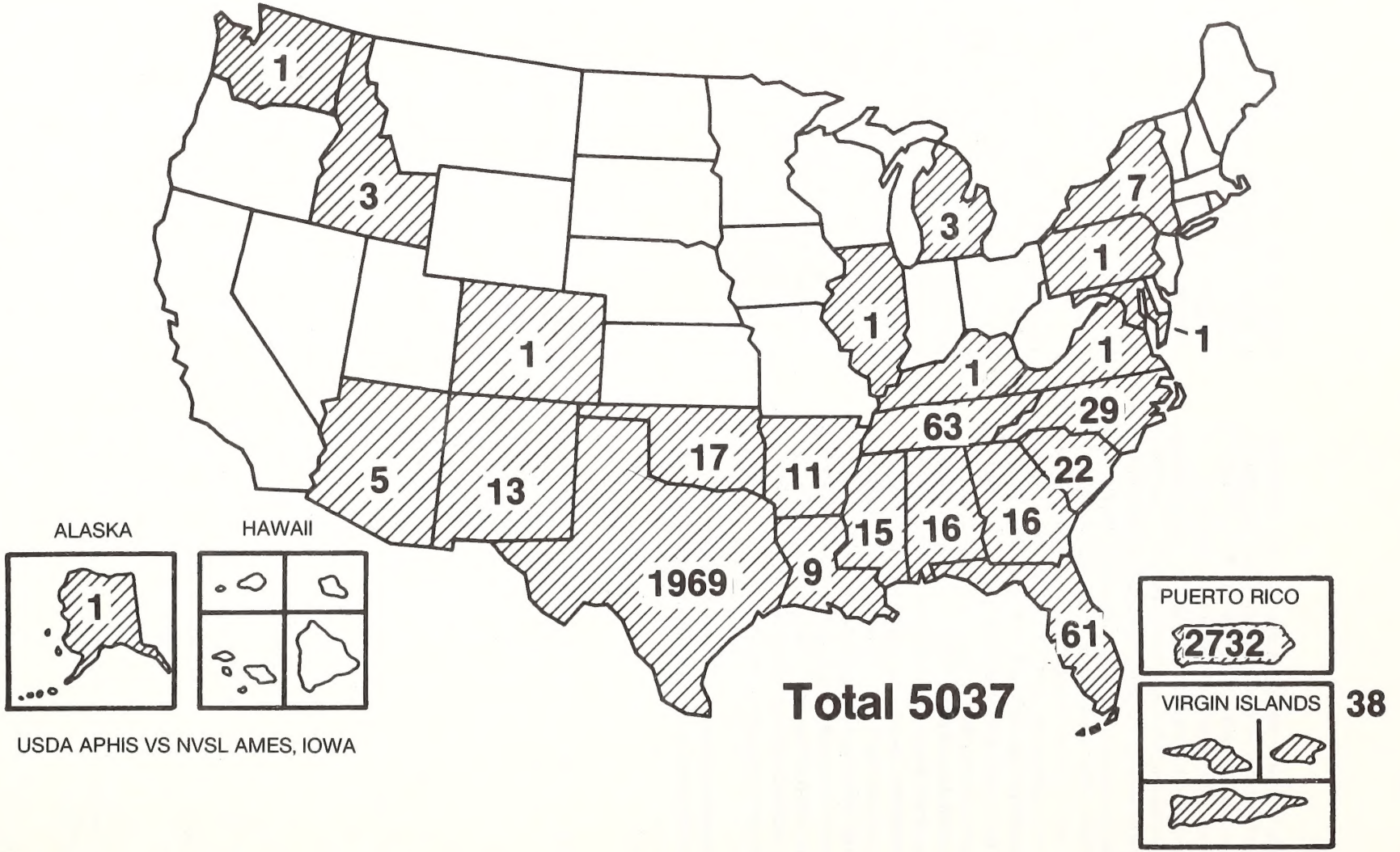
In December 1984, scientists from the National Parasitological Laboratory in Cuernavaca, Mexico, provided the Cattle Fever Tick Research Laboratory, Mission, Texas, with engorged females and eggs of the "Tuxpan" strain, the

first organophosphate-resistant strain of tropical cattle ticks identified in Mexico. The Tuxpan strain, which had been in the laboratory in Mexico for 20 generations, had undergone extensive selection for resistance against coumaphos. Therefore, when the Tuxpan strain was received at Mission, research workers tested it against the flowable formulation of coumaphos by treating Tuxpan strain-infested cattle in a dipping vat. Groups of cattle infested with larval, nymphal, and adult ticks of the Tuxpan strain were dipped in either 0.125, .02, or 0.3 percent coumaphos. For comparison, cattle infested with a susceptible strain of tropical cattle ticks were dipped in 0.125 percent coumaphos. Greater than 99 percent control of the Tuxpan ticks was achieved with all three concentrations of coumaphos, and the level of control with the 0.125 percent treatment against the susceptible strain was also 99 percent. It was concluded that in the laboratory in Mexico, continuous selection pressure had not been maintained against the Tuxpan strain each time it was cycled; and, although some resistant genes were present, their frequency in the laboratory population had diminished. Efforts to obtain a more homogeneous colony of Tuxpan ticks is underway and further evaluations of this strain will be postponed until that goal is achieved.

Tests of several acaricides, which may be alternatives to presently available organophosphate acaricides, are scheduled for evaluation in the near future; and next year information should be available on the results of this activity. Research to determine the biochemical mechanisms of acaricide resistance is focusing on metabolic factors, altered permeability of the tick cuticle, and insensitive cholinesterases as explanations for the altered behavior of the resistant ticks. Preliminary evidence indicates that the ticks in the Tuxtla strain have an altered cholinesterase as well as some enhanced ability metabolize coumaphos.

All research at the Cattle Fever Tick Research Laboratory is not restricted to the problem of acaricide resistance. A considerable effort is being made to further define the factors that limit the survival and rates of growth of populations of both *B. Microplus* and *B. annulatus.* The precise role of white-tailed deer in the maintenance and distribution of *Boophilus annulatus* is another aspect of the ecology of cattle fever ticks that is currently receiving attention. Funding for a 3 year pilot test of sterile hybrid *Boophilus* eradication technology is anticipated for fiscal year 1987. The study will be performed on an approximately 160-acre facility on the island of St. Croix, and will provide an opportunity to test the feasibility of employing this technique as a component of an eradication effort.

Tick Collections From All Hosts
CY 1985



USDA APHIS VS NVSL AMES, IOWA

REPORT OF TICKS COLLECTED

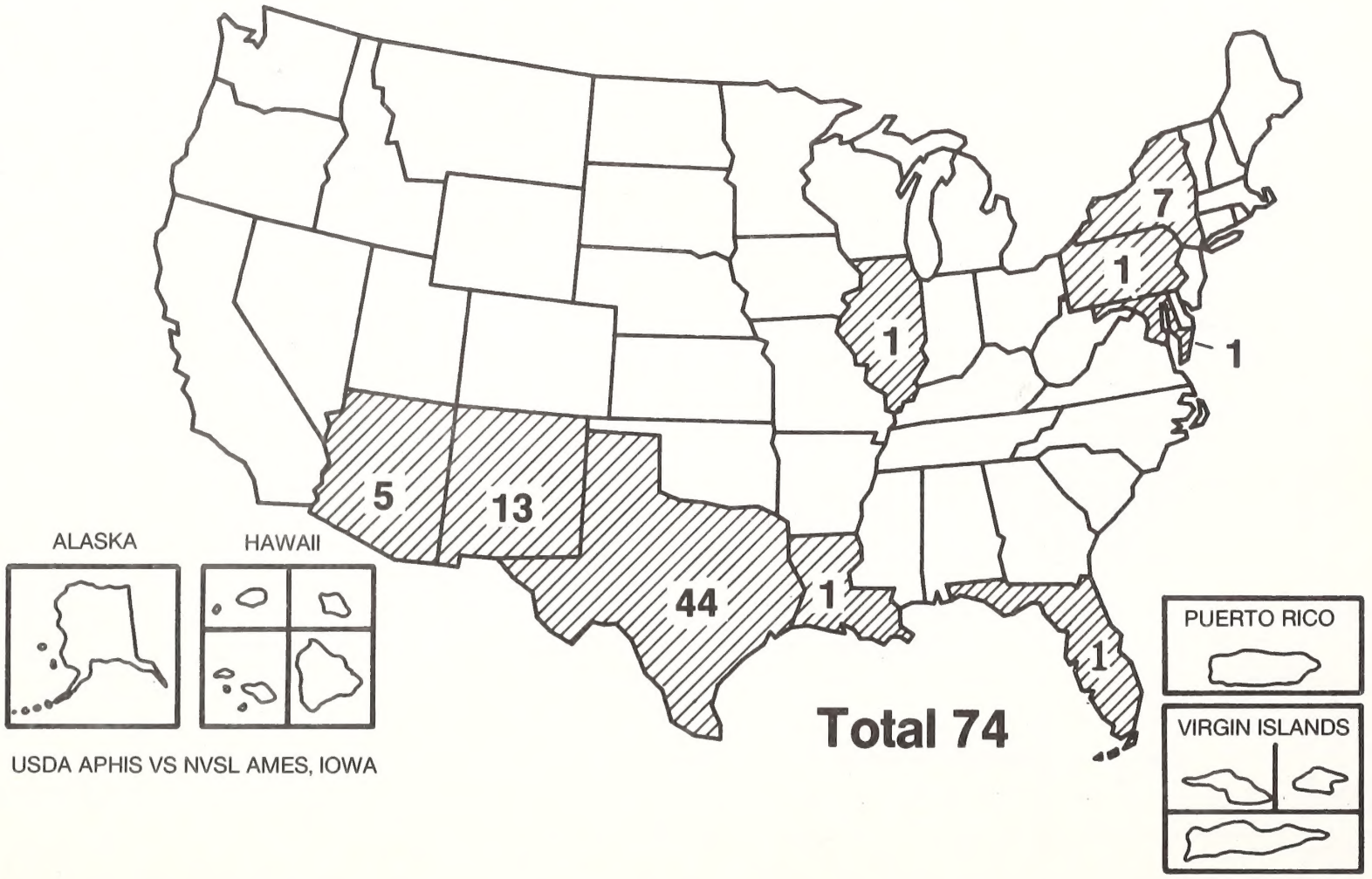
USDA-APHIS

PERIOD: Calendar Year 1985

HOST: All Hosts

STATE	TOTAL	Animals & Products Offered for Entry	Cattle	Dogs	Horses & Mules	Native Wildlife	Zoo Animals & Misc. Hosts
TOTAL	5037	74	3686	186	710	171	210
Alabama	16		7	4			5
Alaska	1			1			
Arizona	5	5					
Arkansas	11					11	
California							
Colorado	1						1
Connecticut							
Delaware							
Florida	61	1	9	3	30	15	3
Georgia	16		3	1		12	
Hawaii							
Idaho	3			1		2	
Illinois	1	1					
Indiana							
Iowa							
Kansas							
Kentucky	1		1				
Louisiana	9	1				8	
Maine							
Maryland	1	1					
Massachusetts							
Michigan	3			2		1	
Minnesota							
Mississippi	15		10				5
Missouri							
Montana							
Nebraska							
Nevada							
New Hampshire							
New Jersey							
New Mexico	13	13					
New York	7	7					
North Carolina	29		12	3		14	
North Dakota							
Ohio							
Oklahoma	17		11			5	1
Oregon							
Pennsylvania	1	1					
Rhode Island							
South Carolina	22		7	9		4	2
South Dakota							
Tennessee	63		52	5	2		4
Texas	1969	44	1091	154	414	98	168
Utah							
Vermont							
Virginia	1						1
Washington	1			1			
West Virginia							
Wisconsin							
Wyoming							
Puerto Rico	2732		2455	2	255		20
Virgin Islands	38		28		9	1	

Tick Collections From Animals And Products Offered For Entry CY 1985



REPORT OF TICKS COLLECTED

USDA-APHIS

PERIOD: Calendar Year 1985

HOST: Animals and Products Offered for Entry

STATE	TOTAL	AMBLYOMMA AMERICANUM	AMBLYOMMA CAYENNENSE	AMBLYOMMA IMITATOR	AMBLYOMMA MACULATUM	AMBLYOMMA SPP.	ARGAS PERSICUS	BOOPHILUS ANNULATUS	BOOPHILUS MICROPLUS	BOOPHILUS SPP.	DERMACENTOR ALBIPICTUS	DERMACENTOR SPP. (FEMALES & NYMPHS)	DERMACENTOR NIGROLINEATUS	DERMACENTOR NITENS	DERMACENTOR OCCIDENTALIS	DERMACENTOR VARIABILIS	DERMACENTOR SPP.	HAEMAPHYSALIS LEPORISPALUSTRIS	IXODES COOKEI	IXODES PACIFICUS	IXODES SCAPULARIS	IXODES SPP.	ORNITHODOROS SPP.	OTOBIUS MEGNINI	RHIPICEPHALUS SANGUINEUS	RHIPICEPHALUS SPP.	MISCELLANEOUS SPP.
TOTAL	74		2					6	9	5	28		3			2	7					4		4	3	1	
ARIZONA																											
Douglas	5										5BO																
FLORIDA																											
Miami Airport	1		1OR																								
ILLINOIS																											
Chicago Airport	1																								1DO		
LOUISIANA																											
New Orleans Airport	1																								1BA		
MARYLAND																											
Baltimore Airport	1																					1VC[h]					
NEW MEXICO																											
Socorro	13										11BO		1BO											1BO			
NEW YORK																											
JFK Airport	5																					3PM[ip]			1DO	1PM[c]	
NYAIC	2															1H	1HO[dr]										
PENNSYLVANIA																											
Philadelphia Airport	1		1H																								
TEXAS																											
Brownsville	3								2BO	1BO*																	
Del Rio	13							3BO	6BO		2BO						2BO*										
Eagle Pass	11							2BO		4BO*	4BO		1BO														
El Paso	12										5BO		1BO				3BO*							3BO			
Laredo	4							1DH	1BO		1BO					1BO											
Presidio	1																1BO*										

VS FORM 7-4
(APR 84)

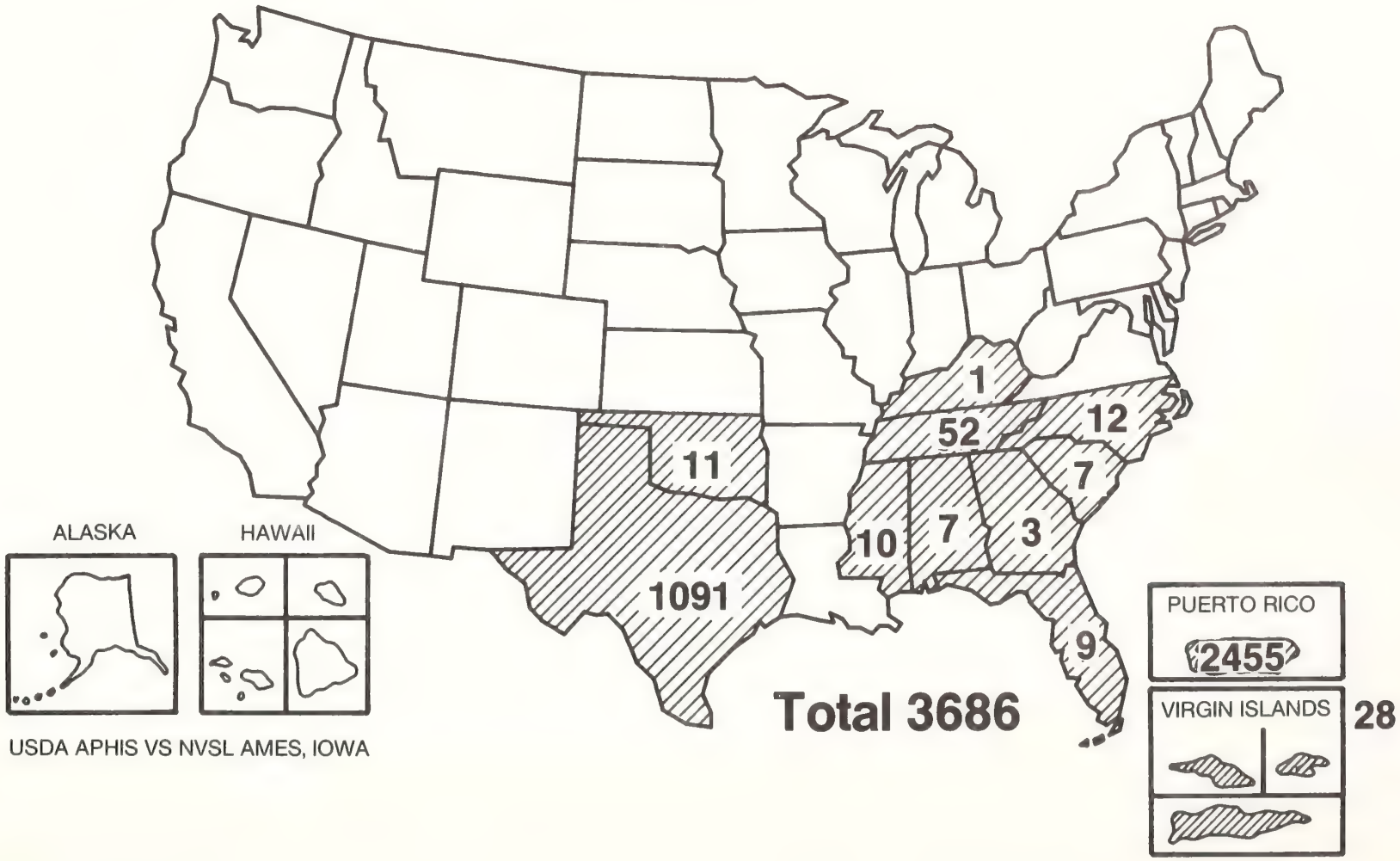
Key to Host
BA Baggage Area
BO Bovine
DH Deer Hide
DO Dog
H Human
HO Horse
OR Orchid
PM Plant Material
VC Virgin Cork

Key to Species
c Rhipicephalus capensis
dr Dermacentor reticulatus
h Ixodes hexagonus
ip Ixodes pilosus

*Nymphal stage

USDA, APHIS, VS
NVSL, AMES, IOWA

Tick Collections From Cattle
CY 1985



REPORT OF TICKS COLLECTED

USDA-APHIS | PERIOD: Calendar Year 1985 | HOST: Cattle

STATE	TOTAL	AMBLYOMMA AMERICANUM	AMBLYOMMA CAJENNENSE	AMBLYOMMA IMITATOR	AMBLYOMMA MACULATUM	AMBLYOMMA SPP.	ARGAS PERSICUS	BOOPHILUS ANNULATUS	BOOPHILUS MICROPLUS	BOOPHILUS SPP.	DERMACENTOR ALBIPICTUS	DERMACENTOR SILVARUM (=DES. ELECTUS & ALBIPICTUS)	DERMACENTOR NITIDUS (=DES. ALBIPICTUS & NITIDUS)	DERMACENTOR NIGROLINEATUS	DERMACENTOR NITENS	DERMACENTOR OCCIDENTALIS	DERMACENTOR VARIABILIS	DERMACENTOR SPP.	HAEMAPHYSALIS LEPORISPALUSTRIS	IXODES COOKEI	IXODES PACIFICUS	IXODES SCAPULARIS	IXODES SPP.	ORNITHODORUS SPP.	OTOBIUS MEGNINI	RHIPICEPHALUS SANGUINEUS	RHIPICEPHALUS SPP.	MISCELLANEOUS SPP.
TOTAL	3686	311	134	2	346	19		12	2330	5	58		9	169		161	1		3			26		1	98	1		
Alabama	7	1			2											2						2						
Alaska																												
Arizona																												
Arkansas																												
California																												
Colorado																												
Connecticut																												
Delaware																												
Florida	9				8																	1						
Georgia	3	1			1											1												
Hawaii																												
Idaho																												
Illinois																												
Indiana																												
Iowa																												
Kansas																												
Kentucky	1	1																										
Louisiana																												
Maine																												
Maryland																												
Massachusetts																												
Michigan																												
Minnesota																												
Mississippi	10	4			4																	2						
Missouri																												
Montana																												
Nebraska																												
Nevada																												
New Hampshire																												
New Jersey																												
New Mexico																												
New York																												
North Carolina	12	1														11												
North Dakota																												
Ohio																												
Oklahoma	11	5									1		1									2			2			
Oregon																												
Pennsylvania																												
Rhode Island																												
South Carolina	7	4			1											2												
South Dakota																												
Tennessee	52	23														29												
Texas	1091	271	134	2	330	10* 5[n]		12	20	5	57		8			116	1*	3				19		1*	96	1		
Utah																												
Vermont																												
Virginia																												
Washington																												
West Virginia																												
Wisconsin																												
Wyoming																												
Puerto Rico	2455					4[v]			2288					163														
Virgin Islands	28								22					6														

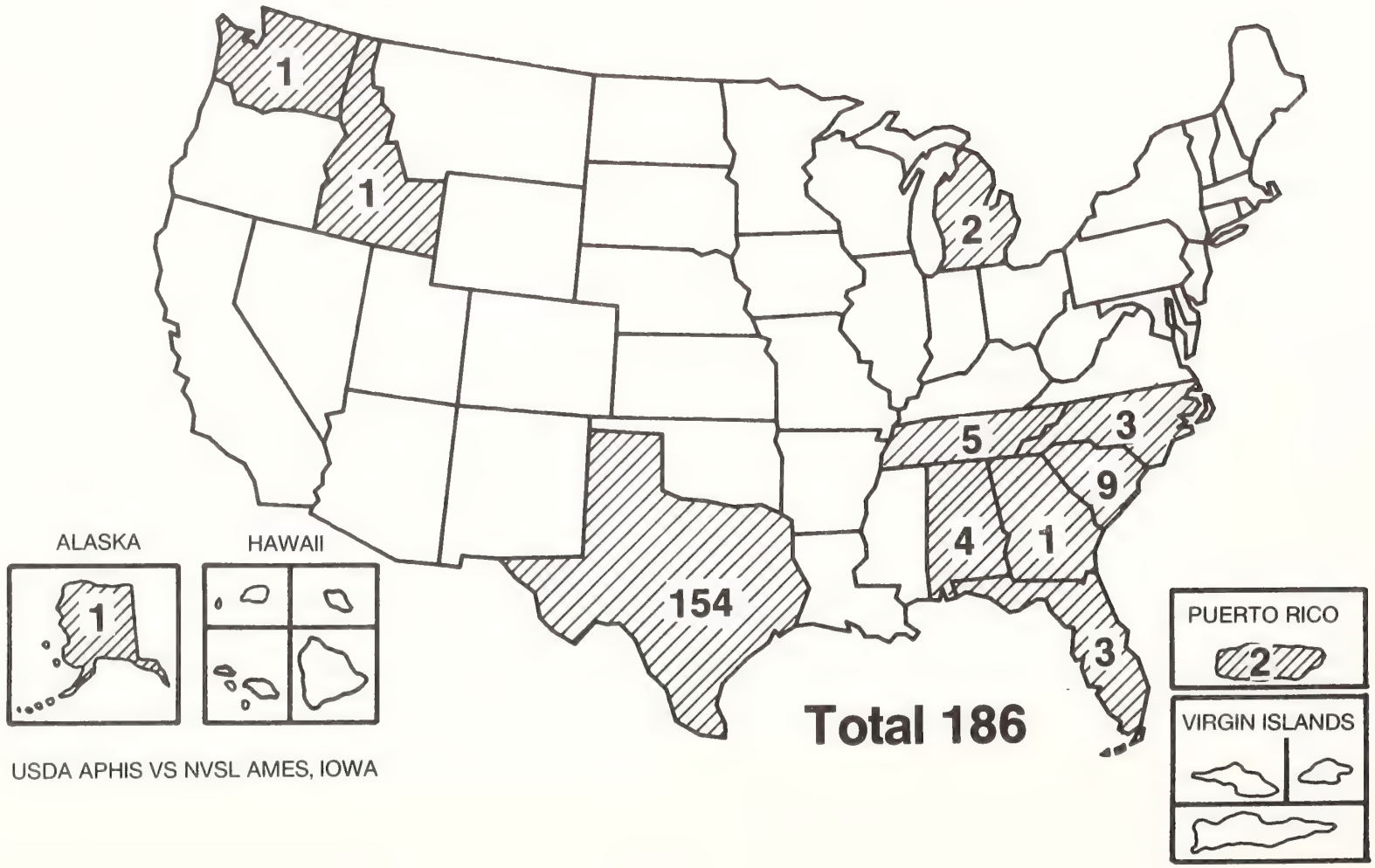
VS FORM T-4 (APR 84)

Key to Species
n Amblyomma inornatum
v Amblyomma variegatum

*Nymphal stage

USDA, APHIS, VS
NVSL, AMES, IOWA

Tick Collections From Dogs
CY 1985



USDA APHIS VS NVSL AMES, IOWA

REPORT OF TICKS COLLECTED

USDA-APHIS

PERIOD: Calendar Year 1985

HOST: Dogs

STATE	TOTAL	AMBLYOMMA AMERICANUM	AMBLYOMMA CAJENNENSE	AMBLYOMMA IMITATOR	AMBLYOMMA MACULATUM	AMBLYOMMA SPP.	ARGAS PERSICUS	BOOPHILUS ANNULATUS	BOOPHILUS MICROPLUS	BOOPHILUS SPP.	DERMACENTOR ALBIPICTUS	DERMACENTOR SILVARUM (=DESTOR VENUSTUS BANKS)	DERMACENTOR NITENS	DERMACENTOR OCCIDENTALIS	DERMACENTOR VARIABILIS	DERMACENTOR SPP.	HAEMAPHYSALIS LEPORISPALUSTRIS	IXODES COOKEI	IXODES PACIFICUS	IXODES SCAPULARIS	IXODES SPP.	ORNITHODORUS SPP.	OTOBIUS MEGNINI	RHIPICEPHALUS SANGUINEUS	RHIPICEPHALUS SPP.	MISCELLANEOUS SPP.
TOTAL	186	4			9	3									54			2		5	1		1	107		
Alabama	4														4											
Alaska	1																				1[a]					
Arizona																										
Arkansas																										
California																										
Colorado																										
Connecticut																										
Delaware																										
Florida	3				1															1				1		
Georgia	1														1											
Hawaii																										
Idaho	1														1											
Illinois																										
Indiana																										
Iowa																										
Kansas																										
Kentucky																										
Louisiana																										
Maine																										
Maryland																										
Massachusetts																										
Michigan	2														1			1								
Minnesota																										
Mississippi																										
Missouri																										
Montana																										
Nebraska																										
Nevada																										
New Hampshire																										
New Jersey																										
New Mexico																										
New York																										
North Carolina	3																	1		1				1		
North Dakota																										
Ohio																										
Oklahoma																										
Oregon																										
Pennsylvania																										
Rhode Island																										
South Carolina	9	2																		1				6		
South Dakota																										
Tennessee	5	1													3									1		
Texas	154	1			8	1* 2[n]									43					2				97		
Utah																										
Vermont																										
Virginia																										
Washington	1														1											
West Virginia																										
Wisconsin																										
Wyoming																										
Puerto Rico	2																						1**	1		
Virgin Islands																										

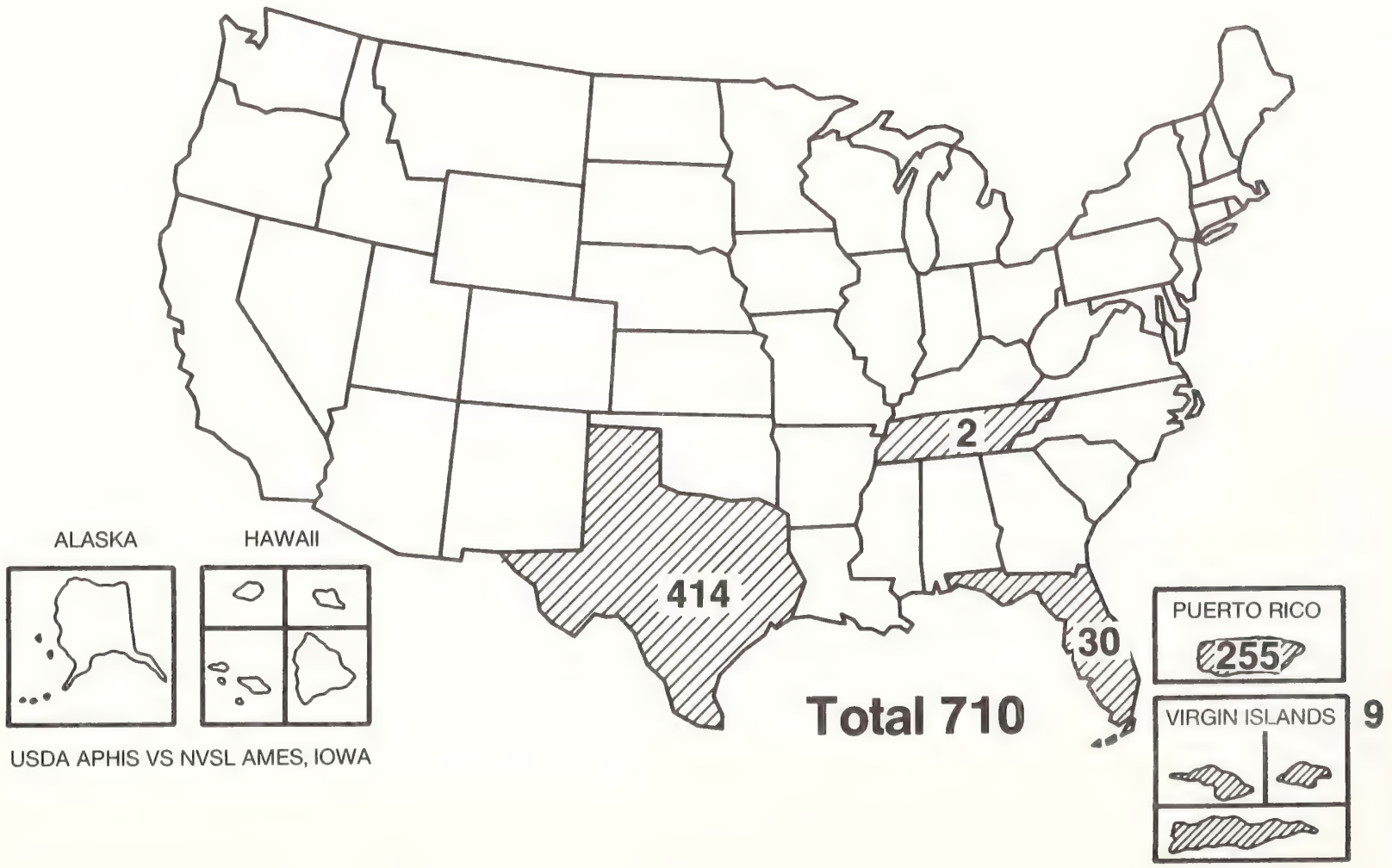
VS FORM T-4 (APR 84)

Key to Species
n Amblyomma inornatum
a Ixodes angustus

*Nymphal stage
**Dog arrived from Arizona at Isla Grande Airport

USDA, APHIS, VS
NVSL, AMES, IOWA

Tick Collections From Horses And Mules
CY 1985



REPORT OF TICKS COLLECTED

USDA-APHIS

PERIOD: Calendar Year 1985

HOST: Horses and Mules

STATE	TOTAL	AMBLYOMMA AMERICANUM	AMBLYOMMA CAJENNENSE	AMBLYOMMA IMITATOR	AMBLYOMMA MACULATUM	AMBLYOMMA SPP.	ARGAS PERSICUS	BOOPHILUS ANNULATUS	BOOPHILUS MICROPLUS	BOOPHILUS SPP.	DERMACENTOR ALBIPICTUS	DERMACENTOR NITENS (VARIABILIS & ANDERSONI)	DERMACENTOR NIGROLINEATUS	DERMACENTOR NITENS	DERMACENTOR OCCIDENTALIS	DERMACENTOR VARIABILIS	DERMACENTOR SPP.	HAEMAPHYSALIS LEPORISPALUSTRIS	IXODES COOKEI	IXODES PACIFICUS	IXODES SCAPULARIS	IXODES SPP.	ORNITHODOROS SPP.	OTOBIUS MEGNINI	RHIPICEPHALUS SANGUINEUS	RHIPICEPHALUS SPP.	MISCELLANEOUS SPP
TOTAL	710	7	34	6	67	4			21	1	7		2	266		289					3			3	1		
Alabama																											
Alaska																											
Arizona																											
Arkansas																											
California																											
Colorado																											
Connecticut																											
Delaware																											
Florida	30				9									18							3						
Georgia																											
Hawaii																											
Idaho																											
Illinois																											
Indiana																											
Iowa																											
Kansas																											
Kentucky																											
Louisiana																											
Maine																											
Maryland																											
Massachusetts																											
Michigan																											
Minnesota																											
Mississippi																											
Missouri																											
Montana																											
Nebraska																											
Nevada																											
New Hampshire																											
New Jersey																											
New Mexico																											
New York																											
North Carolina																											
North Dakota																											
Ohio																											
Oklahoma																											
Oregon																											
Pennsylvania																											
Rhode Island																											
South Carolina																											
South Dakota																											
Tennessee	2															2											
Texas	414	7	34	6	58	3*				1*	7		2	6		287								2	1		
Utah																											
Vermont																											
Virginia																											
Washington																											
West Virginia																											
Wisconsin																											
Wyoming																											
Puerto Rico	255								20					235													
Virgin Islands	9					1v			1					7													

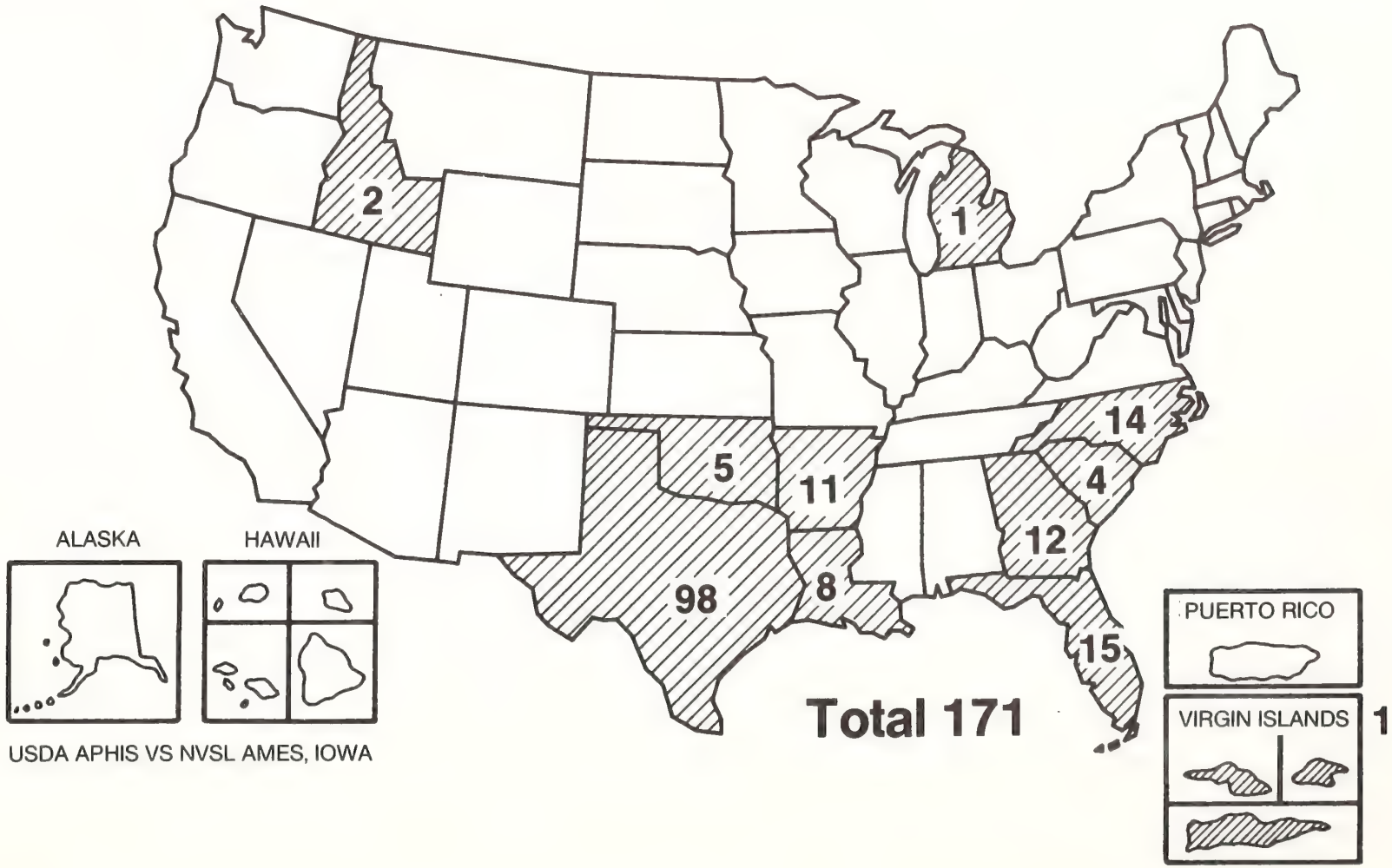
VS FORM T-4 (APR 84)

Key to Species
v Amblyomma variegatum

*Nymphal stage

USDA, APHIS, VS
NVSL, AMES, IOWA

Tick Collections From Native Wildlife
CY 1985



REPORT OF TICKS COLLECTED

USDA-APHIS | PERIOD: Calendar Year 1985 | HOST: Native Wildlife

STATE	TOTAL	AMBLYOMMA AMERICANUM	AMBLYOMMA CAJENNENSE	AMBLYOMMA IMITATOR	AMBLYOMMA MACULATUM	AMBLYOMMA SPP.	ARGAS PERSICUS	BOOPHILUS ANNULATUS	BOOPHILUS MICROPLUS	BOOPHILUS SPP.	DERMACENTOR ALBIPICTUS	DERMACENTOR ANDERSONI STILES, OR D. VARIABILIS (SAY)	DERMACENTOR NITENS	DERMACENTOR OCCIDENTALIS	DERMACENTOR VARIABILIS	DERMACENTOR SPP.	HAEMAPHYSALIS LEPORIS PALUSTRIS	IXODES COOKEI	IXODES PACIFICUS	IXODES SCAPULARIS	IXODES SPP.	ORNITHODOROS SPP.	OTOBIUS MEGNINI	RHIPICEPHALUS SANGUINEUS	RIPICEPHALUS SPP.	MISCELLANEOUS SPP.
TOTAL	171	54	2	1	20	3			1		6	1	13			17	2	41			7	1	1		1		
Alabama																										
Alaska																										
Arizona																										
Arkansas	11	11D																								
California																										
Colorado																										
Connecticut																										
Delaware																										
Florida	15	+3SD 5D			1D	1GT[t]											p 1JR**				+4SD					
Georgia	12	12D																								
Hawaii																										
Idaho	2										1D	1D														
Illinois																										
Indiana																										
Iowa																										
Kansas																										
Kentucky																										
Louisiana	8	4D			4D																					
Maine																										
Maryland																										
Massachusetts																										
Michigan	1												1E													
Minnesota																										
Mississippi																										
Missouri																										
Montana																										
Nebraska																										
Nevada																										
New Hampshire																										
New Jersey																										
New Mexico																										
New York																										
North Carolina	14	14D																								
North Dakota																										
Ohio																										
Oklahoma	5	2WT											1D								1D 1WT					
Oregon																										
Pennsylvania																										
Rhode Island																										
South Carolina	4	1D											2D								1D					
South Dakota																										
Tennessee																										
Texas	98	1D 1CO	1D 1J	1D	11D 2CO 2BC	1D* 1RC*					5D		9D			7CO 1D 2BC 2J 3PO 2RC	1J[i]	41R				1R[tv]	1AR*		1BC	
Utah																										
Vermont																										
Virginia																										
Washington																										
West Virginia																										
Wisconsin																										
Wyoming																										
Puerto Rico																										
Virgin Islands	1							1D																		

VS FORM T-4 (APR 84)

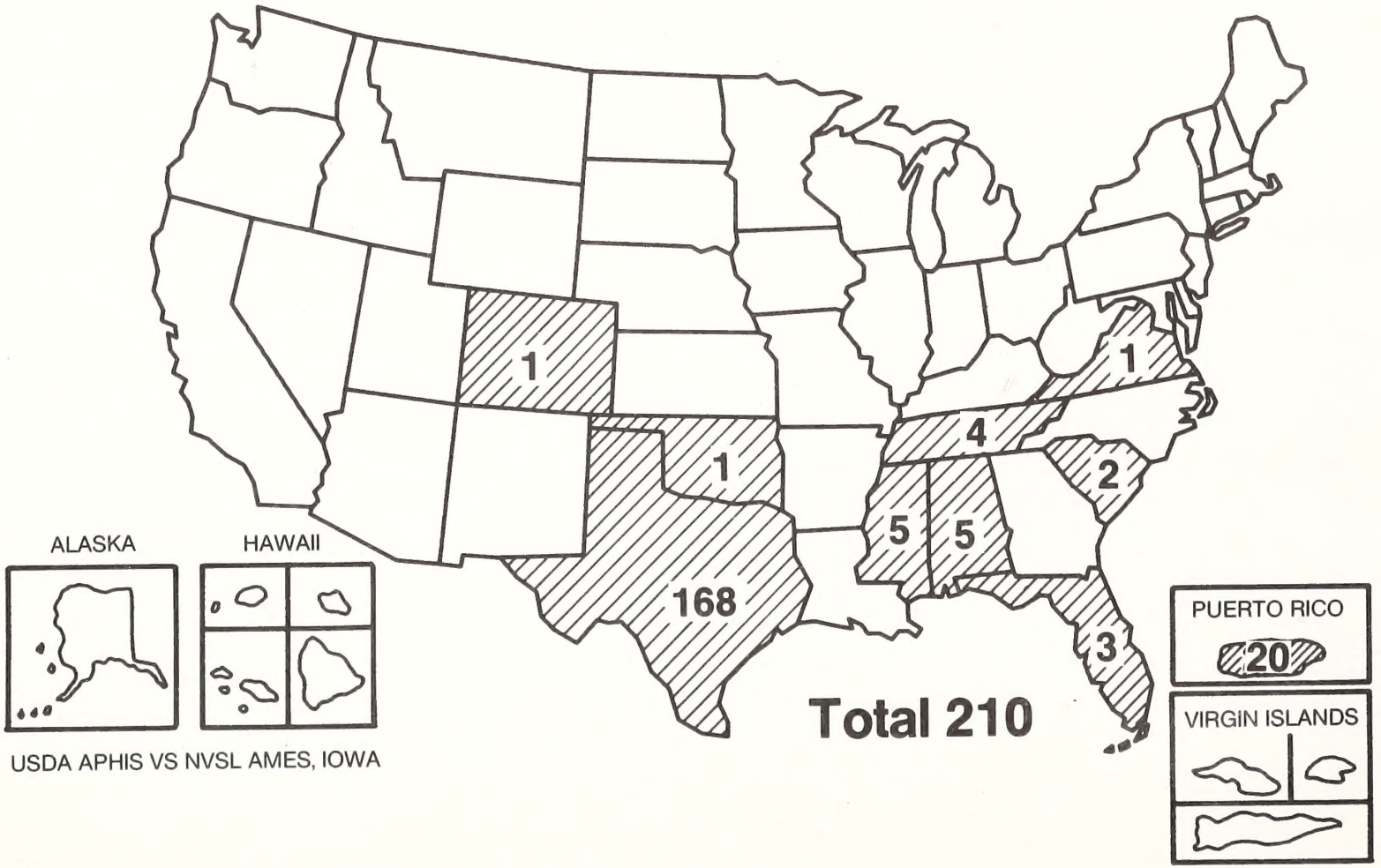
Key to Host
AR Armadillo
BC Bobcat
CO Coyote
D Deer
E Elk
GT Gopher-Tortoise
J Javelina
JR Jack Rabbit
PO Opossum
R Rabbit
RC Raccoon
SD Sambar Deer
WT Wild Turkey

Key to Species
i Dermacentor halli
p Dermacentor parumapertus
t Amblyomma tuberculatum
tv Ixodes tovari

* Nymphal-stage
** Rabbits denied entry into Florida from Texas
\+ These deer were introduced into Florida over 20 years ago

USDA, APHIS, VS
NVSL, AMES, IOWA

Tick Collections From Zoo Animals And Miscellaneous Hosts CY 1985



REPORT OF TICKS COLLECTED

USDA-APHIS

PERIOD: Calendar Year 1985

HOST: Zoo Animals and Miscellaneous Hosts

STATE	TOTAL	AMBLYOMMA AMERICANUM	AMBLYOMMA CAJENNENSE	AMBLYOMMA IMITATOR	AMBLYOMMA MACULATUM	AMBLYOMMA SPP.	ARGAS PERSICUS	BOOPHILUS ANNULATUS	BOOPHILUS MICROPLUS	BOOPHILUS SPP.	DERMACENTOR ALBIPICTUS	DERMACENTOR SPICATUS (U.S. & CANADA)	DERMACENTOR NIGROLINEATUS	DERMACENTOR NITENS	DERMACENTOR OCCIDENTALIS	DERMACENTOR VARIABILIS	DERMACENTOR SPP.	HAEMAPHYSALIS LEPORISPALUSTRIS	IXODES COOKEI	IXODES PACIFICUS	IXODES SCAPULARIS	IXODES SPP.	ORNITHODOROS SPP.	OTOBIUS MEGNINI	RHIPICEPHALUS SANGUINEUS	RHIPICEPHALUS SPP.	MISCELLANEOUS SPP.
TOTAL	210	66	47		9	10	1		3	1				17		35	1				8				9	2	1
Alabama	5	1Q 1H			1Q											1X 1H											
Alaska																											
Arizona																											
Arkansas																											
California																											
Colorado	1					h 1TH**																					
Connecticut																											
Delaware																											
Florida	3	1Q 1H														1H											
Georgia																											
Hawaii																											
Idaho																											
Illinois																											
Indiana																											
Iowa																											
Kansas																											
Kentucky																											
Louisiana																											
Maine																											
Maryland																											
Massachusetts																											
Michigan																											
Minnesota																											
Mississippi	5	1H								d 1TH**																2TH* **	y 1TH**
Missouri																											
Montana																											
Nebraska																											
Nevada																											
New Hampshire																											
New Jersey																											
New Mexico																											
New York																											
North Carolina																											
North Dakota																											
Ohio																											
Oklahoma	1																				1C						
Oregon																											
Pennsylvania																											
Rhode Island																											
South Carolina	2	1H				1IG[f] ***																					
South Dakota																											
Tennessee	4	1Q 1H														1Q									1Q		
Texas	168	1Q 1S	1S 42Y		1H 1AU	1S 1X										23Y 1Q	1Y[i]				7Y				2H 6X		
Utah		7H 1G	2AU 2H		1G 3Y	1H 5Y*										1C 6H											
Vermont		48Y			2S																						
Virginia	1						1CH																				
Washington																											
West Virginia																											
Wisconsin																											
Wyoming																											
Puerto Rico	20								1G 2S					15G 2S													
Virgin Islands																											

VS FORM T-4 (APR 84)

Key to Host
AU Aoudad
C Cat
CH Chicken
G Goat
H Human
IG Iguana
Q Host not given
S Sheep
TH Trophy Hide
X Inanimate Object
Y Swine

Key to Species
d Boophilus decoloratus
f Amblyomma dissimile
h Amblyomma hebraeum
i Dermacentor halli
y Hyalomma truncatum

* Nymphal stage
** Origin – Africa (inspection at approved taxidermy)
*** Origin – Venezuela

USDA, APHIS, VS
NVSL, AMES, IOWA

Issued June 1987